

Current Status and Future Directions for IERS RS/PC Predictions of UT1

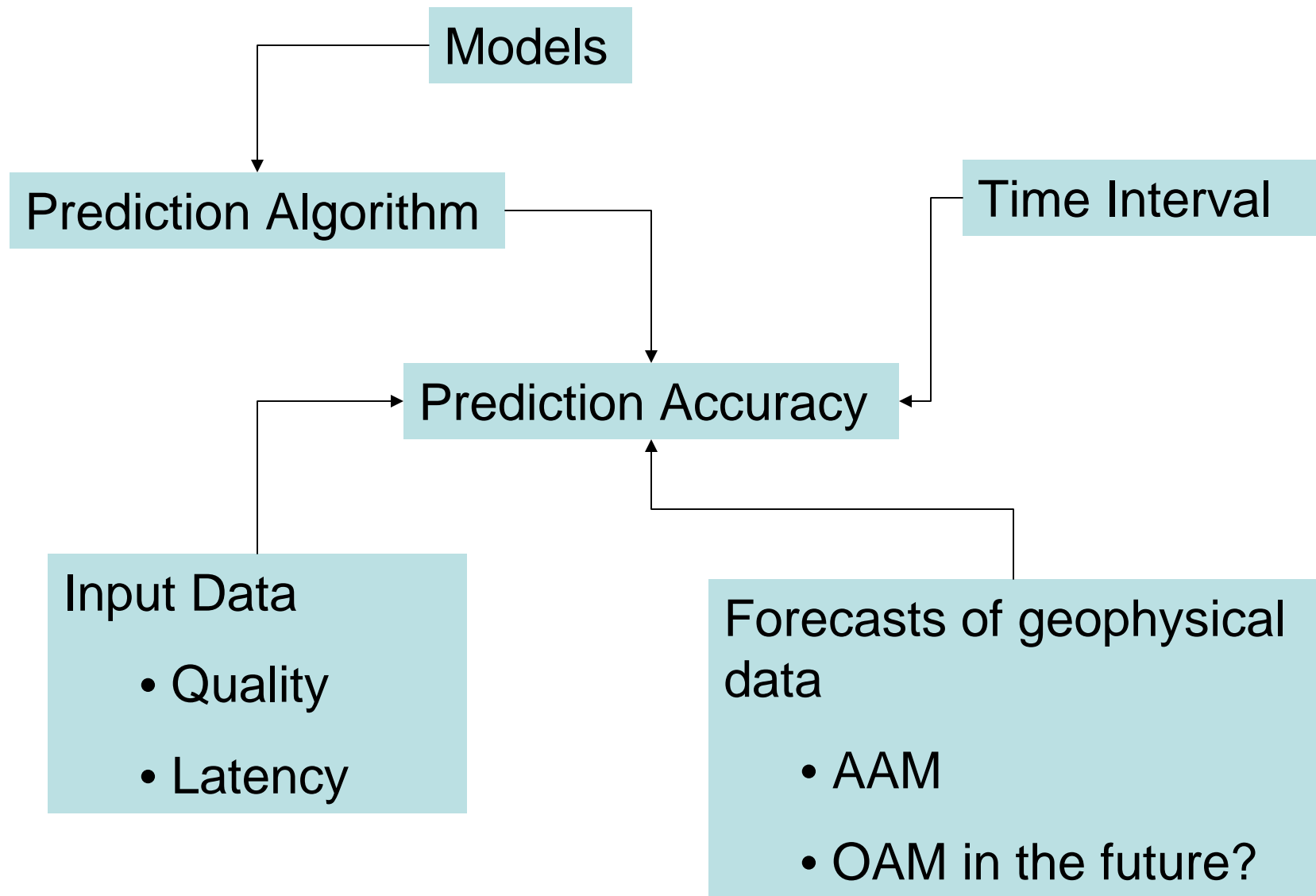
William Wooden

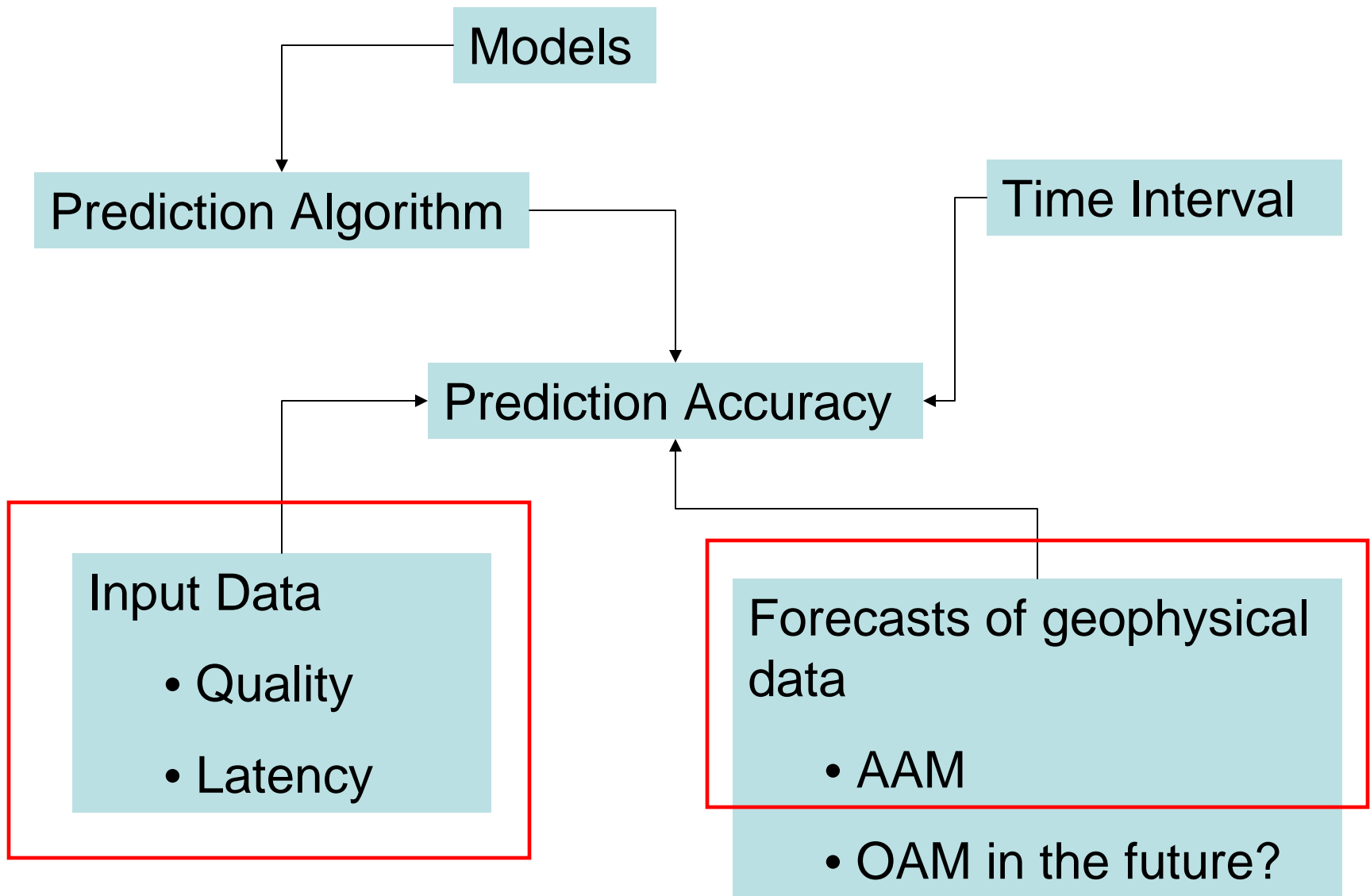
Brian Luzum

Nick Stamatakos

IERS RS/PC Review

- Produce daily and weekly EOP combination and prediction solutions
 - Daily EOPs produced after 1700 UTC
 - Weekly EOPs produced Thursday after 1700 UTC
 - Include AAM, GPS, SLR, and VLBI data
 - Roughly 700 users by e-mail per week
 - Roughly 40000 ftp downloads per month
 - Most use the data for non-research purposes (85 to 90%)
 - Not all are technically skilled





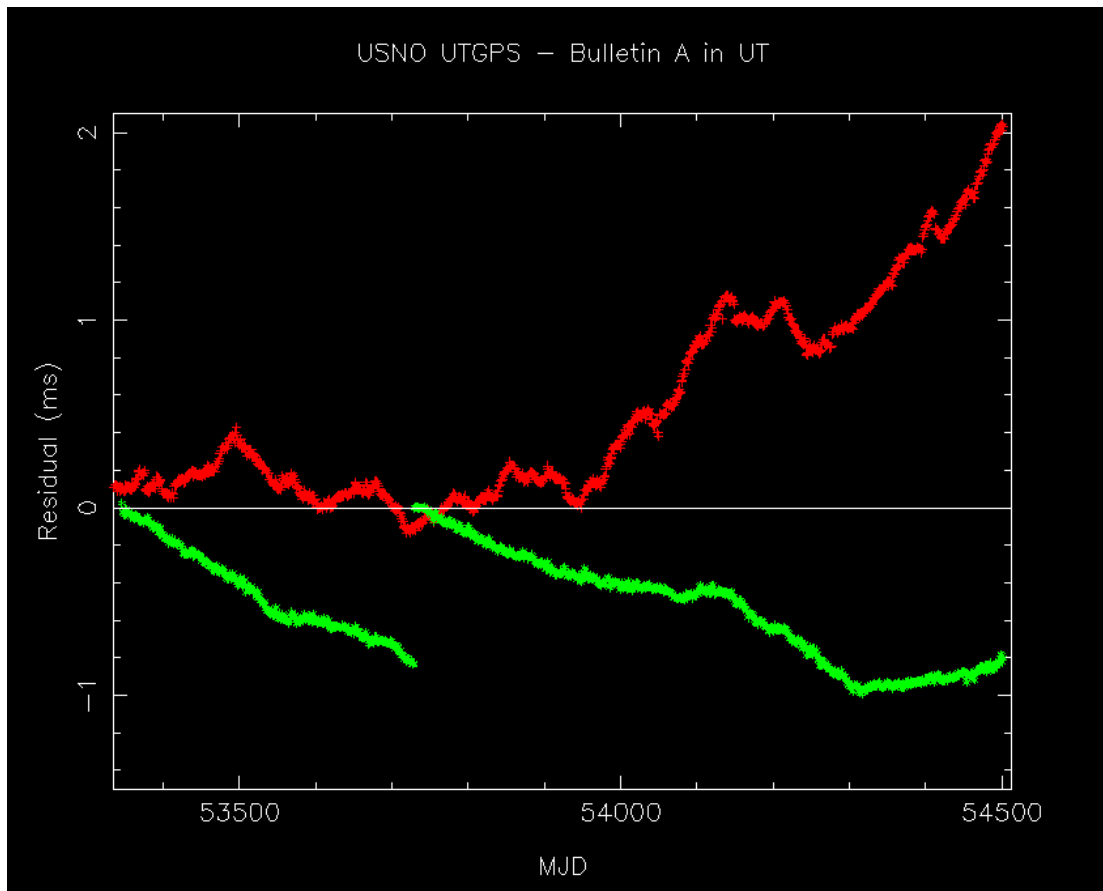
Recent Changes

- AAM forecast data from National Centers for Environmental Prediction (NCEP) and U.S. Navy's Operational Global Atmospheric Prediction System (NOGAPS) was increased from 5 to 7.5 days, and, on 4 October 2007, was added to the EOP combination and prediction software
- Prediction accuracy has improved beyond 5 days since this change
 - Improvement by ~15%

New USNO UTGPS

- Quality of new UTGPS data
 - Uses more satellites
 - Typically ~15-25 vs. ~10
 - Uses more sophisticated orbital modeling
 - Initial results look promising
 - Significant improvement in UT estimates
 - Also improves UT1 predictions
 - Improved data quality
 - Improved predictability

Residuals of Raw UTGPS



Current UTGPS

New UTGPS

e-Transfer Intensives

- Electronically transferred (rapid) VLBI are intensives observed and processed such that they are available in less than 12 hours
 - More current than IGS Ultra observations
- Effect of rapid intensives on RS/PC on combinations and predictions
 - Analysis started 30 Sept 2007 and has continued to the present
 - Only last day of combination and first (1-day) prediction analyzed
 - The finals.daily results are separated into those created with and those without rapid intensives

E-transfer Intensives (continued)

- Limited number of solutions with rapid intensives
 - Results are preliminary
 - Noticeable improvement in combination solution
 - Roughly a factor of 2 improvement over standard solution
 - Estimated error of rapid intensives is roughly the same as estimated error of the intensives
 - Combination close to obtaining maximum estimated improvement
 - Prediction improvement is smaller
 - Roughly 25% improvement over standard solution

E-Transfer Intensives: Preliminary Analysis

Intensive	Solution	Number of Points	Estimated Accuracy (μs)
Rapid	Combination	35	25
Rapid	Prediction	35	91
Standard	Combination	544	55
Standard	Prediction	543	124

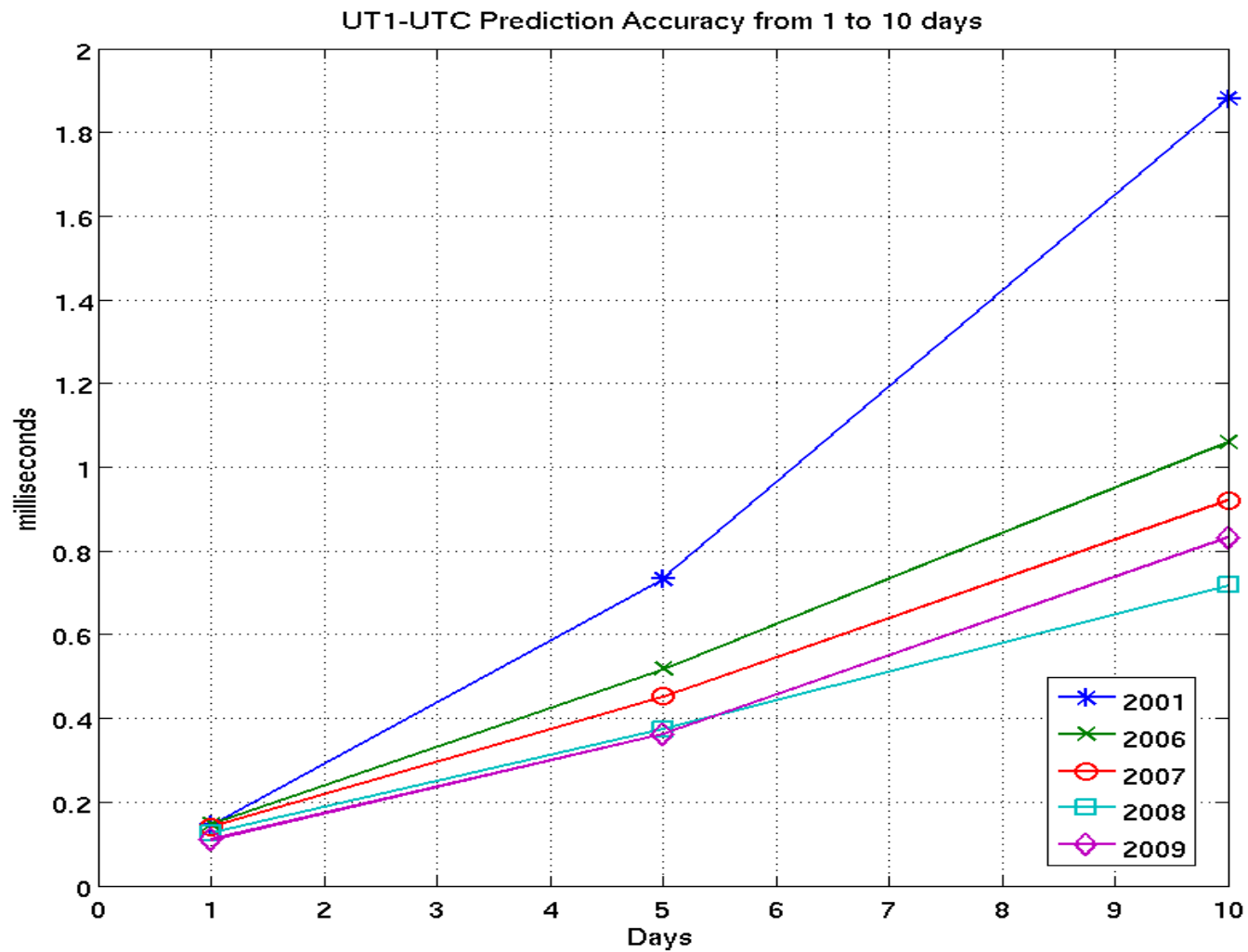
E-VLBI Future

- Fortaleza is connected
 - Undergoing tests
- Kokee Park antenna will be connected soon



- Kk-Wz Intensive latency should soon be less than 24 hours
- Improved latency for weekly EOP experiments

Recent Improvements in EOP Data



How frequently should EOP solutions be updated?

- Currently: EOP solutions are updated daily
- Near Future: Twice per day EOP solutions from IERS RS/PC
- Future: Continually updated EOP solutions?

What prediction length should the algorithms be optimized for?

- Depends on users' needs
 - Most users need real-time EOP
 - Most stringent accuracy requirements
 - Still need predictions to a few weeks
 - Lower accuracy requirement
 - Small number of users of predictions out to a few years
 - Ephemeris development
 - Leap second prediction
 - Lower accuracy requirement

IERS Prediction Workshop

- 19-21 October 2009 in Warsaw, Poland
 - Registration and abstract deadline 31 August
- Sessions on
 - A priori models, observations and combined solutions
 - Geophysical excitation functions and their predictions
 - EOP prediction techniques and algorithms
- Discussion and recommendations for the future
- <http://www.cbk.waw.pl/EOPPW2009>